

### REMARKS

In the last Office Action, the Examiner objected to claim 36 as containing informalities. Claims 18, 24-25, 34-35, 37-38 and 47-49 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,259,835 to Jing. Claims 18-25, 32, 36-38, 42-46 and 51-53 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,805,759 to Fukushima in view of U.S. Patent No. 6,769,792 to Bornhorst. Claims 26-28, 30, 39-40 and 50 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukushima and Bornhorst and further in view of U.S. Patent No. 6,469,421 to Wakabayashi. Claims 26-29 and 39-41 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukushima and Bornhorst and further in view of U.S. Patent No. 6,384,514 to Slutskiy. Claim 31 was rejected under 35 U.S.C. §103(a) as being unpatentable over Fukushima, Bornhorst and Wakabayashi and further in view of U.S. Patent No. 6,144,140 to Iino et al. Claim 33 was objected to as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claim 33. However, for the reasons noted below, applicants respectfully submit that amended claims 27, 39, 50 and dependent claims 40 and 41 also patentably distinguish from the prior art of record.

In accordance with the present response, claim 27 has been rewritten in independent form to incorporate the subject matter of base claim 18 and intervening claim 26. Allowable claim 33 has been rewritten in independent form to incorporate the subject matter of base claim 18. Claim 39 has been rewritten in independent form to incorporate the subject matter of base claim 37 and intervening claim 38. Claim 50 has been rewritten in independent form to include the subject matter of base claim 49. Claims 18-26, 28-32, 34-38, 42-49 and 51-53 have been canceled without prejudice or admission.

In view of the foregoing amendments, the objection to claim 36 and the prior art rejections of claims 18-26, 28-32, 34-38, 42-49 and 51-53 have been rendered moot.

Applicants most respectfully request entry of the foregoing amendments since they merely comprise the presentation of dependent claims in independent form including all of the limitations of the base claim and any intervening claims. All of the subject matter of the amended claims has already been considered by the Examiner. Thus, no further consideration or search is necessitated by the amendments. In addition, the amendments substantially narrow any appealable issues because they present the claims in a substantially narrowed form and cancel a significant number of other claims. Thus, entry of the foregoing amendments does not impose a burden on the Examiner and should not be denied.

Applicants request reconsideration of their application in light of the foregoing amendments and the following discussion.

### **Brief Summary of The Invention**

The present invention is directed to an optical communication device.

As described in the specification, (pages 1-2), conventional optical communication devices have poor operational reliability and do not meet the current demand for optical communication devices having a compact structure.

The present invention overcomes the drawbacks of the conventional art. Figs. 1-4 show an embodiment of an optical communication device 1 according to the present invention embodied in the claims. The optical communication device 1 has an optical system 10, 10a, 10b for propagating a light beam 100 along a light beam path, optical parts 21 disposed on opposite sides of the light beam path, driving means 22 for independently driving each of the optical parts 21 between a first position in which the corresponding optical part intersects the light beam path (e.g., see position of the optical part 21 intersecting the light beam path in Fig. 2B) and a second position in which the corresponding optical part does not intersect the light beam path (e.g., see position of each optical part 21 which does not intersect the light beam path in Fig. 2B), and driving control means for controlling

the drive means to independently drive each of the optical parts 21 between the first and second positions.

Preferably, the optical parts 21 comprise at least two different types of optical parts, such as optical parts having different wavelength transmission characteristics, different wavelength absorption characteristics, or different light amount transmitting characteristics. The driving means preferably comprises piezoelectric actuators 22 each for independently driving a respective one of the optical parts 21 between the first and second positions. Preferably, each of the piezoelectric actuators 22 comprises a piezoelectric body 22b, 22c for generating stretching vibrations and a moving body 22d frictionally driven by stretching vibrations generated by the piezoelectric body.

By the foregoing construction, the optical communication device has excellent operational reliability (e.g., a high operational torque). Furthermore, by providing driving means comprised of piezoelectric actuators having the specific structure recited in the claims, the optical communication device according to the present invention is more compact as compared to conventional optical communication devices.

#### **Traversal of Prior Art Rejections**

Claims 27, 39, 40 and 50 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukushima in view of Bornhorst and further in view of Wakabayashi. Applicants

respectfully traverse this rejection and submit that the combined teachings of Fukushima, Bornhorst and Wakabayashi do not disclose or suggest the subject matter recited in amended claims 27, 39 and 50 and dependent claim 40.

It is well settled that the Examiner must satisfy his burden of establishing a prima facie case of obviousness by showing that some objective teaching or suggestion in the applied prior art taken as a whole and/or knowledge generally available to one of ordinary skill in the art would have led that person to the claimed invention, including each and every limitation of the claims, without recourse to the teachings in applicants' disclosure. See generally, In re Rouffet, 47 USPQ2d 1453, 1456, 1457-1458 (Fed. Cir. 1998); In re Oeticker, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992). In this case, the Examiner has failed to carry his burden of making out a prima facie case of obviousness with respect to the subject matter recited in claims 27, 39, 40 and 50.

Independent claims 27, 39 and 50 are directed to an optical communication device for propagating a light beam along a light beam path. Claim 27 requires a plurality of optical parts disposed on opposite sides of the light beam path, and driving means for independently driving each of the optical parts between a first position in which the corresponding optical part intersects the light beam path and a second position in which the corresponding optical part does not intersect the light beam path, the driving means

comprising a plurality of piezoelectric actuators each for independently driving a respective one of the optical parts, and each of the piezoelectric actuators comprising a piezoelectric body for generating stretching vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric.

Independent claim 39 recites that each of the at least one first optical member and the at least one second optical member includes driving means for driving the first optical part and the second optical part, respectively, between the first and second positions, each of the driving means comprising a piezoelectric actuator having a piezoelectric body for generating stretching vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric body.

Independent claim 50 recites driving means for driving the optical part between a first position in which the optical part intersects the light beam path and a second position in which the optical part does not intersect the light beam path, each of the driving means comprising a piezoelectric actuator having a piezoelectric body for generating stretching vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric body.

The structural and functional combinations of the optical communication device recited in independent claims 27,

39 and 50 are not disclosed or suggested by the combined teachings of Fukushima, Bornhorst and Wakabayashi.

Fukushima discloses an optical equalizer having a movable attenuating plate 6 and a driver 32 for driving the attenuating plate in XYZ directions. Bornhorst discloses high intensity lighting projectors. As recognized by the Examiner, the combined teachings of Fukushima and Bornhorst do not disclose or suggest the specific structure of the driving means recited in independent claims 27, 39 and 50, including a plurality of piezoelectric actuators each comprising a piezoelectric body for generating stretching vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric body.

The Examiner cited the reference to Wakabayashi for its disclosure of a piezoelectric device having a vibrator and a moving body. The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the piezoelectric device of Wakabayashi into the optical equalizer of Fukushima because the piezoelectric device "is stable and simple in production process". Applicants respectfully disagree with the Examiner's contention.

First, it is unclear how the Examiner proposes to modify the optical equalizer of Fukushima to incorporate the piezoelectric devices of Wakabayashi. For example, would the piezoelectric devices replace the driver 32 of Fukushima? If

so, how would the piezoelectric devices of Wakabayashi be connected to the optical equalizer of Fukushima so that the piezoelectric devices displace the attenuator plate 6 along the Y-Z axes and rotate the attenuator plate 6 about the X axis, as required by Fukushima (col. 6, lines 54-58)?

Second, in assessing obviousness, the invention as a whole must be considered, including its properties and the problems it solves. See In re Wright, 6 USPQ2d 1959, 1961 (Fed. Cir. 1988) ("the determination of whether a novel structure is or is not 'obvious' requires cognizance of the properties of that structure and the problem which it solves, viewed in light of the teachings of the prior art"); In re Rinehart, 189 USPQ 143, 149 (CCPA 1976) ("the particular problem facing the inventor must be considered in determining obviousness"); Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co., 221 USPQ 481, 488 (Fed. Cir. 1984) ("it is error to focus solely on the product created, rather than on the obviousness or nonobviousness of its creation").

In rejecting the subject matter of claims 27, 39 and 50, the Examiner did not properly take into account the improvements in the optical communication device achieved by the claimed structure of the driving means disclosed in the specification. More specifically, the specific structure of the driving means recited in claims 27, 39 and 50, which requires a plurality of piezoelectric actuators each comprising a piezoelectric body for generating stretching



vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric, permits the optical communication device to be more compact and have improved operational reliability (e.g., a high operational torque) as compared to conventional optical communication devices (specification, pg. 5, line 17 to pg. 6., line 19).

Thus, it is incorrect, as the Examiner has done here, to merely focus on the differences between the prior art and the invention claimed in claims 27, 39 and 50, and then to state that the differences themselves are obvious. As set forth above, the invention claimed in independent claims 27, 39 and 50 as a whole must be considered, including its properties and the problems it solves.

Accordingly, one of ordinary skill in the art would not have been led to further modify Fukushima, as modified by Bornhorst, in view of Wakabayashi in the manner proposed by the Examiner in the statement of rejection. The only basis for the modifications urged by the Examiner in the rejection is applicants' own disclosure, and such hindsight rejections are improper. Diversitech Corp. v. Century Steps, Inc., at 1318.

Moreover, independent claim 27 recites "driving control means for controlling the driving means to independently drive each of the optical parts between the

first and second positions." Under the guidelines set forth by the Court of Appeals for the Federal Circuit, means-plus-function language in a claim must be construed to cover the structure described in the specification, and equivalents thereof, to the extent that the specification provides such disclosure. In re Donaldson Co., Inc., 29 USPQ2d 1845, 1849 (Fed. Cir. 1994). When claim 27 is construed in this manner, the claimed "driving control means" must be construed to cover the structure recited in the specification and equivalents thereof.

One embodiment of the structure of the "driving control means" recited in independent claim 27 is shown in Figs. 1 and 5 and described on page 11, line 19 to page 13, line 1. The "driving control means" comprises a self-excited oscillating circuit 31 for controlling the piezoelectric actuators 22 to independently drive each of the optical parts 21 between the first position (i.e., the optical parts intersect the light beam path) and the second position (i.e., the optical parts do not intersect the light beam path). By the foregoing construction, the piezoelectric actuators, and thus the optical parts, can be driven more accurately and efficiently. Neither Fukushima, Bornhorst nor Wakabayashi discloses or suggests such structure. In this regard, Fukushima and Bornhorst do not disclose any type of

piezoelectric device or self-excited oscillating circuit as recognized by the Examiner. While disclosing a piezoelectric device, Wakabayashi does not disclose or suggest any type of driving device, and specifically a self-excited oscillating circuit, for the piezoelectric device.

Independent claims 39 and 50 similarly patentably distinguish from the combined teachings of Fukushima, Bornhorst and Wakabayashi. Independent claim 39 recites "control means for controlling movement of the first optical part and the second optical part between the first and second positions", the control means including "means for controlling each of the driving means to independently drive the first and second optical parts." Independent claim 50 recites "driving control means for independently controlling the drive means of each of the optical members to drive the corresponding optical part between the first and second positions thereof." Neither Fukushima, Bornhorst nor Wakabayashi discloses or suggests the structure corresponding to the "control means" (claim 39) and "driving control means" (claim 50) recited in claims 39 and 50 as set forth above for independent claim 27.

Claim 40 depends on and contains all of the limitations of amended independent claim 39 and, therefore, distinguishes from the references at least in the same manner as claim 39.

In view of the foregoing, applicants respectfully request that the rejection of claims 27, 39, 40 and 50 under 35 U.S.C. §103(a) as being unpatentable over Fukushima in view of Bornhorst and further in view of Wakabayashi be withdrawn.

Claims 27, 39, 40 and 41 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fukushima in view of Bornhorst and further in view of Slutskiy. Applicants respectfully traverse this rejection and submit that the combined teachings of Fukushima, Bornhorst and Slutskiy do not disclose or suggest the subject matter recited in amended claims 27 and 39 and dependent claims 40-41.

Independent claims 27 and 39 are directed to an optical communication device as set forth above for the rejection of claims 27, 39, 40 and 50 under 35 U.S.C. §103(a) as being unpatentable over Fukushima, Bornhorst and Wakabayashi.

As recognized by the Examiner, the combined teachings of Fukushima and Bornhorst do not disclose or suggest the specific structure of the driving means recited in independent claims 27 and 39, including a plurality of piezoelectric actuators each comprising a piezoelectric body for generating stretching vibrations and a moving body frictionally driven by stretching vibrations generated by the piezoelectric body.

The Examiner cited the reference to Slutskiy for its disclosure of a piezoelectric positioning device having a vibrator and a moving body. The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the piezoelectric positioning device of Slutskiy into the optical equalizer of Fukushima because the piezoelectric positioning device "is small, light weight and reliable." Applicants respectfully disagree with the Examiner's contention.

It is unclear how the Examiner proposes to modify the optical equalizer of Fukushima to incorporate the piezoelectric positioning device of Slutskiy. For example, will the piezoelectric positioning device replace the driver 32 of Fukushima? If so, how would the piezoelectric positioning device of Slutskiy be connected to the optical equalizer of Fukushima so that the piezoelectric positioning device displaces the attenuator plate 6 along the Y-Z axes and rotates the attenuator plate 6 about the X axis, as required by Fukushima (col. 6, lines 54-58)? Furthermore, as set forth above for the rejection based on Wakabayashi, in rejecting the subject matter of claims 27 and 39 the Examiner did not properly take into account the improvements in the optical communication device achieved by the claimed structure of the driving means disclosed in the specification and reiterated herein.

Moreover, neither Fukushima, Bornhorst nor Slutskiy discloses or suggests the structure corresponding to the "driving control means" (claim 27) and "control means" (claim 39) recited in claims 27 and 39 as set forth above for the rejection of claims 27 and 39 based on the combined teachings of Fukushima, Bornhorst and Wakabayashi.

Thus independent claims 27 and 39 are not rendered obvious by the combined teachings of Fukushima, Bornhorst and Slutskiy because the references do not suggest the modifications that would be needed to replicate the claimed invention. In the context of obviousness rejections based upon the purported obviousness of effecting a required modification, the Federal Circuit has held that "[t]he mere fact that the prior art may be modified in [a given] manner ... does not make the modification obvious unless the prior art suggested the desirability of the modification". In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). There is nothing in Slutskiy that would have suggested modifying the optical equalizer of Fukushima, as modified by Bornhorst, to achieve the optical communication device discussed above and recited by independent claims 27 and 39.

Claims 40 and 41 depend on and contain all of the limitations of amended independent claim 39 and, therefore, distinguish from the references at least in the same manner as claim 39.

In view of the foregoing, applicants respectfully request that the rejection of claims 27, 39, 40 and 41 under 35 U.S.C. §103(a) as being unpatentable over Fukushima in view of Bornhorst and further in view of Slutskiy be withdrawn.

Applicants most respectfully request entry of the foregoing amendments since they merely comprise the presentation of dependent claims in independent form including all of the limitations of the base claim and any intervening claims. All of the subject matter of the amended claims has already been considered by the Examiner. Thus, no further consideration or search is necessitated by the amendments. In addition, the amendments substantially narrow any appealable issues because they present the claims in a substantially narrowed form and cancel a significant number of other claims. Thus, entry of the foregoing amendments does not impose a burden on the Examiner and should not be denied.

In view of the foregoing amendments and discussion,  
the application is believed to be in allowable form.  
Accordingly, entry of this amendment and favorable  
reconsideration and allowance of the claims are most  
respectfully requested.

Respectfully submitted,

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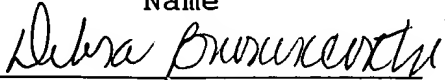
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